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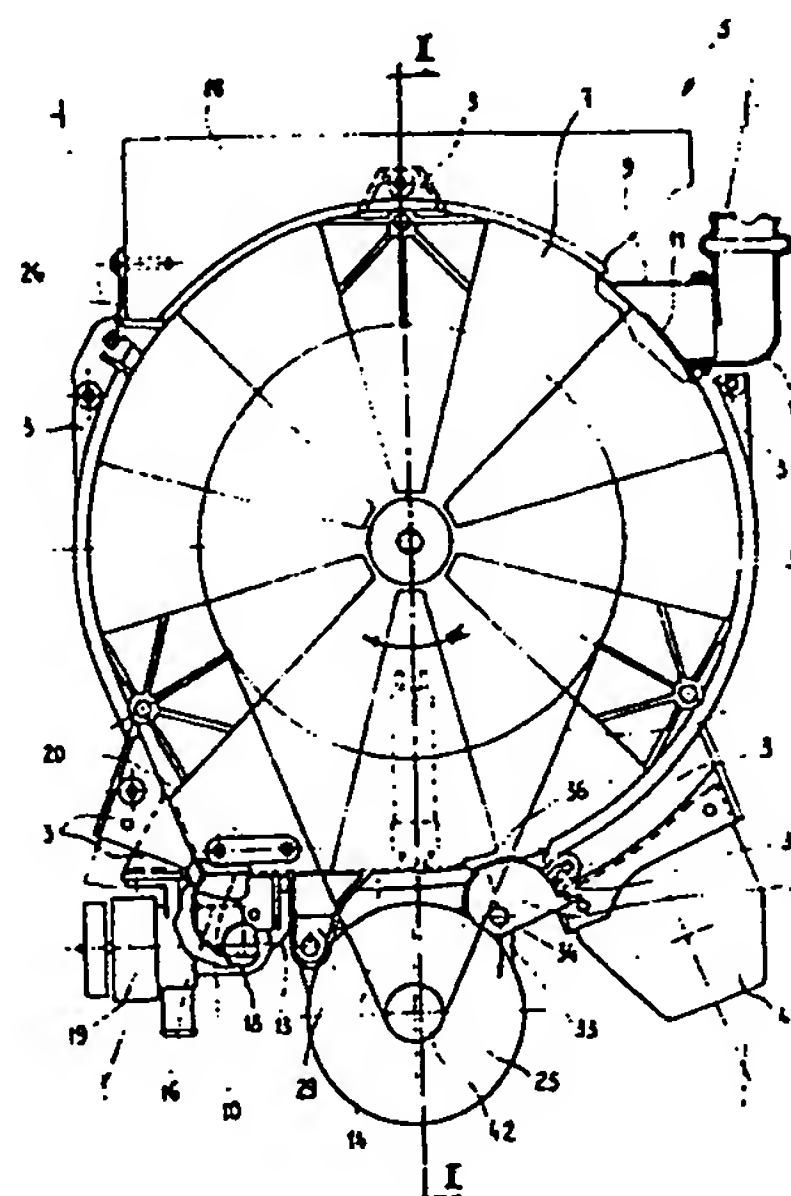
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③⑤ Plastic tub for a laundry washing machine.

⑤⑦ Described is a tub formed of a plastics material for a laundry washing machine of the front-loading type. According to the invention, the tub (5) is formed of two substantially cylindrical half-shells (6, 7) connected to one another in longitudinal alignment by means of bolts passing through integrally formed flanges.

The tub is formed with a planar bottom portion (14, 14') and a liquid discharge opening located adjacent one side thereof in direct communication with a filter body (13) integrally formed with the forward half-shell (6). The rear half-shell (7) is integrally formed with liquid inlet leans (9, 11) acting as a siphon steam trap, and mounting means for a drum actuating motor (25) Cam means (34, 35) cooperating with the rear half-shell (7) is provided for tensioning a transmission belt (41) extending between motor (25) and a drum pulley (38). The flange (3) for interconnecting the two half-shells is advantageously configured so as to permit a circulation pump (19) to be mounted thereon in communication with the filter body (13).



1 Description

The present invention relates to a tub formed of a plastics material and adapted to be employed in a domestic laundry washing machine of the front-loading type, and improved so
5 as to facilitate and render more economical the manufacture and use of a machine of this type.

With a view to avoiding the difficulties and to reducing
10 the manufacturing and maintenance costs of laundry washing machines having metal washing tubs there have been proposed various solutions employing plastic tubs. Some of these proposals have been directed to one-piece tubs integrally formed with seat means for the fixation of suspension elem-
15 ents, counterweights, and actuating means.

These solutions suffer from the disadvantage, however, of requiring the employ of moulds of very large dimensions and of intricate provisions for positioning numerous inserts
20 within the mould.

In addition, the operation of mounting the various components on the tub requires the latter to be repeatedly displaced about different axes.
25

Also known are washing tubs for the specified purpose consisting of two half-shells bolted together.

This type of tubs suffers from the drawback of not being
30 integrally provided with lugs or similar means for the fixation of counterweights or equilibration weights, so that these weights have to be secured to the tub by means of annular metal clamps, or have to be injected into cavities integrally formed with the tub. In the former case,
35 the weights secured to the outer walls of the tub are formed of a cement mixture which is compressed so as to increase its density. For obvious reasons, this compression cannot be carried out on a cement mixture injected into the tub

1 cavities, resulting in a greater volume of the cement mix-
ture for a given weight. In addition, the cavities have to
be formed with anchoring studs or the like for avoiding
noisy vibrations of the cement mixture during the launder-
5 ing operation.

A further disadvantage of known plastic tubs of this type
results from their perfectly circular shape which requires
the diameter of the tub to be substantially greater than
10 that of the washing drum so as to define therebetween a
space of sufficiently great dimensions for the installation
of resistance heater elements. Under these aspects, the fact
that the tub is perfectly circular obviously results in a
disadvantageous increase of the space required by the tub
15 within the housing of the washing machines at locations not
required for the installation of heater elements. It is also
to be noted that in conventional tubs of the type described,
the discharge opening is formed exactly at the center of
the lower portion of the tub, so that at least part of the
20 detergent supplied to the tub with the first water charge
enters the discharge system and remains therein without
being used unless there is a recirculation passage between
the discharge system and an additional opening of the tub.
In addition to this inconvenience the centered location of
25 the discharge outlet opening is disadvantageous with regard
to the discharge of the laundering liquid during the centri-
fuging phase, as the liquid flow during this phase is direct-
ed substantially at right angles to the axis of the discharge
opening. This requires the employ of baffles for deflecting
30 the liquid flow towards the discharge opening.

In conventional washing tubs of this type, a bellows-type
discharge conduit has its distal end connected to a filter
element itself connected to the intake of a discharge pump
35 mounted in the housing of the machine. This construction
obviously requires an increased number of connections and
thus numerous manual operations for assembly. The same app-
lies to the fixation of the drum actuating motor which is

1 provided with four integrally formed seat portions adapted
to be secured by means of transverse bolts and with the
interposition of spacers, to corresponding studs formed with
openings and projecting from the lower part of the tub. In
5 this case, the tension of the transmission belt is adjusted
by varying the position of the motor with respect to the tub.
To this purpose, at least a pair of the openings formed in
the studs of the tub are of arcuately elongate shape so as
to permit the motor to be adjusted to the desired position.
10 This adjustment operation likewise requires a sequence of
manual operations and is practically incapable of positively
achieving and maintaining the desired tension of the belt.

A further disadvantage encountered in conventional tubs
15 results from the arrangement and construction of a rubber
tubing connecting the tub to a detergent distributor and
additionally acting as a syphon for trapping a quantity of
water sufficient for obstructing the water inlet conduit so
as to preclude the escape of steam generated during oper-
20 ation of the washing machine.

To this effect, the rubber tubing or a similar conduit has
to be of U-shaped configuration requiring a rather complic-
ated forming operation. It is obvious that the above
25 described disadvantages constitute an obstacle to the ass-
sembly of the tub in an automatized process, as they require
the tub to be displaced about various axes and the execut-
ion of numerous manual operations.

30 It is therefore an object of the present invention to
provide a washing tub formed of a plastics material, in
which the above noted inconveniences are eliminated and
which lends itself to assembly in a highly automatized
process.

35 These objects are attained by a washing tub made of a plast-
ics material for a domestic laundry washing machine of the
front-loading type, said tub being formed of two half-shells

1 of substantially cylindrical shape interconnected in longitudinal alignment by means of respective flanges bolted together, and provided with means for the supply and discharge of washing liquids, means for filtering the liquids
5 during the discharge phase, and means for the fixation of counterweights, for the adjustable mounting of drum actuating means, and for the connection of the tub to the housing of the washing machine, said tub being characterized in that the two half-shells comprise respective and adjacent
10 lower portions of their internal surface having a planar profile, the forward half-shell comprising an integrally formed discharge opening disposed laterally of said portion, and a filter body directly communicating with said discharge opening, the rear half-shell comprising cam means for
15 tensioning a transmission belt connecting the shaft of a motor to a pulley fixedly secured to the drum shaft.

The characteristics and advantages of the invention will become more clearly evident from the following description,
20 given by way of example with reference to the accompanying drawings, wherein:

fig. 1 shows a rear view of a tub constructed in accordance with the invention, and

fig. 2 shows a sectional view of the tub taken along the
25 line II-II in fig. 1.

The washing tub according to the invention is composed of two half-shells, namely, as shown in fig. 2, a forward half-shell 6 and a rear half-shell 7 formed of a thermoplastic material by compression moulding or the like method.
30 Half-shells 6 and 7 are of substantially cylindrical shape and joined to one another, with a sealing gasket 39 therebetween, by means of flanges 3 integrally formed along the abutting edges and bolted to one another. As shown in fig. 2,
35 the forward half-shell 6 is formed with an opening 8 for charging the drum (not shown) of the machine, with an inlet opening 9 for the washing liquid, and an opening 10 for the discharge of the liquid.

1 As evident from fig. 1, inlet opening 9 is formed with a tubular portion projecting from tub 5 and having a flow passage of circular cross-section restricted by a semi-circular wall 11 extending upwards from the lower edge of 5 opening 9 in alignment with the peripheral wall of tub 5.

In this manner the tubular portion of inlet 9 participates in the formation of a syphon which is completed by a rubber sleeve 12 of a considerably simplified design as compared 10 to known embodiments. The two half-shells 6 and 7 are formed with corresponding lower portions 14, 14' of their interior wall surface having a planar profile. Planar portions 14, 14' are disposed in alignment with one another so as to constitute a substantially planar bottom of tub 5.

15

As shown in fig. 1, discharge opening 10 is offset with respect to the vertical axis of tub 5 and in direct communication with a filter body 13 which in the tub 5 according to the invention is advantageously formed integral with 20 forward half-shell 6. In other words, discharge opening 10 is located adjacent a margin of planar bottom 14, 14' and at the downstream side thereof with respect to the direction of rotation (indicated by an arrow in fig. 1) of the drum containing the laundry to be laundered.

25

The planar configuration of the bottom of tub 5 and the integration of filter body 13 ensure that on charging tub 5 the detergent carried by the water accumulates preferentially on the planar bottom 14, 14', and to a smaller degree 30 on the bottom of filter body 13, which may itself be considered as part of the bottom of tub 5, so that the detergent accumulated thereon is put into circulation by the turbulence created by the movements of the drum.

35 This solution advantageously permits the elimination of the conventionally required sleeve connecting the tub to the filter body and of the additional recirculation opening in the tub and the associated conduit connecting it to the

1 filter body. Filter body 13 is formed with an outer main
opening 15 for the removable installation of a filter
partition 16 integrally formed with an expansion plug 17
for hermetically sealing the filter body, and with a second-
5 ary opening 18 for connection to the intake of a circula-
tion pump 19 with suitable sealing gaskets inserted there-
between.

Circulation pump 19 is not secured to the housing of the
10 washing machine, but to a suitably formed flange 3 of the
tub 5 according to the invention, as shown in fig. 1. This
is particularly advantageous, as it reduces the necessity
of manual operations for installation and thus permits the
tub to be assembled in a highly automatized process.

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Also to be noted is that the offset position of discharge
opening 10 is effective to promote the discharge flow
during the centrifuging phase, as the opening is directed
opposite to the flow direction of the liquid resulting from
20 rotation of the drum. This improves the discharge of the
liquid during the centrifuging phase without the use of
deflecting baffles. It is also to be noted that the planar
bottom portion 14, 14' of tub 5 is effective to form an
enlarged space between the tub and the drum adjacent dis-
25 charge opening 10.

This enlarged space is advantageously employed for housing
a resistance heater element 20 which may thus be accommod-
ated without excessively increasing the dimensions of tub 5
30 so as to save valuable space within the housing accommod-
ating the tub.

Also integrally formed with forward half-shell 6 is an
annular collar 21 provided with bores for securing thereto
35 a forward counterweight 22 by means of screws 23 cooper-
ating with expansion dowels.

This solution for the fixation of the counterweight is also

1 particularly advantageous with a view to completely automat-
ized assembly of the tub.

Also formed integrally with forward half-shell 6 and pro-
5 jecting outwards from the bottom portion thereof is an
L-shaped lug 24 forming part of the mounting means of the
drum actuating motor 25, as will be explained in detail.

Integrally formed with rear half-shell 7 are flange means 26
10 for securing an upper counterweight 28 by means of screws 27
cooperating with expansion dowels, and an L-shaped lug 29
in coaxial alignment with lug 24 of forward half-shell 6.

The two lugs 24 and 29 are adapted to engage a corresponding
15 pair of anchoring studs 30, 31 projecting from the body of
motor 25, threaded fastener means 32 being provided to
secure motor 25 to lug 24.

In addition to lugs 24 and 29, a further anchoring point is
20 provided for motor 25 in the form of a support bracket 33
engaging a horizontally disposed bolt 34. Bolt 34 is integ-
rally connected to a cam 35 having a toothed cam profile
extending along a spiral curve of progressively increasing
radius with respect to its mounting axis.

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The toothed profile of cam 35 cooperates with a toothed
sector 36 formed at the lower part of rear half-shell 7
(fig. 1). As an alternative, toothed sector 36 may be
formed at the base of a lug having an elongate opening for
30 guiding bolt 34 as it follows a downwards displacement of
motor 25. The free end of the toothed profile of cam 35 is
connected to toothed sector 36 through a tension spring 37
biasing cam 35 together with bolt 34 in anticlockwise
direction. This arrangement is effective to automatically
35 tension a transmission V-belt 41.

In particular, transmission belt 41 is tensioned by merely
pushing down motor 25 by exerting pressure on a pulley 42

1 secured to the motor shaft, permitting cam 35 to be rotated
together with bolt 34 to a position in which its toothed
profile is reengaged with toothed sector 36. In this manner
belt 41 is tensioned to the desired degree with a reliabil-
5 ity unattainable by known manual adjustment means. The
described tensioning means is also useful for compensating
elongation of belt 41 during operation of the laundry
washing machine.

10 This is because cam 35 is constantly biased by spring 37 in
a direction for displacing bolt 34 so as to automatically
ensure proper tensioning of belt 41.

The tub 5 according to the invention also solves the prob-
15 lem of providing a suitably formed edge surrounding the
forward loading opening 8 during the tub forming process.
In conventional tubs this edge is designed to cooperate
with annular clamp means for securing a bellows connecting
the tub to the door opening of the housing of the washing
20 machine.

In the tub 5 according to the invention, the edge of open-
ing 8 is formed with an L-shaped cross-sectional profile
terminating in a broadened rim 43. A connecting bellows 44
25 has an inner end portion formed with a channel-shaped
cross-section for receiving the broadened rim of opening
edge 43 and secured thereto by means of a compression ring
45 having a U-shaped profile for clampingly retaining the
end portion of bellows 44 on the broadened rim 43.

30

The combination of the specific advantages of the tub 5
according to the invention is particularly relevant
under the aspect of automatized assembly. Successive phases
of the assembling process may in fact be carried out with
35 displacements about a single vertical axis and in the
following sequence:

a) mounting of the driven drum pulley 38 and assembling
rear half-shell 7 with the various drive components;

- 1 b) mounting of the drum and positioning the sealing gasket 39 to be interposed between the two half-shells 6 and 7;
- c) mounting and securing forward half-shell 6;
- d) connecting vibration dampener plates 40 and securing 5 counterweights 22 and 28;
- e) mounting motor 25 and discharge pump 19;
- f) properly tensioning drive belt 41 by exerting a suitable pressure on driving pulley 42.

10 The main advantages of the washign tub 5 according to the invention may be summarized as follows:

- simplification and rationalization of the moulding process;
- 15 - integration of various components directly on the tub and the resultant reduction and simplification of the assembly steps;
- the possibility of automatized assembly of the laundering assembly thanks to the possibility of mounting the various 20 components with displacements about a single vertical axis and with reduced displacements of the various parts.

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Plastic Tub for a Laundry Washing Machine

Patent Claims:

- 25 1. A plastic tub for a domestic laundry washing machine of the front-loading type, said tub being formed of two substantially cylindrical half-shells connected to one another in longitudinal alignment by means of respective flanges bolted together, and provided with means for the introduction and discharge of washing liquids, means for
30 filtering said liquids during the discharge phase, and means for securing counterweights, for adjustably mounting elements for the actuation of the drum, and for the connection of the tub to the housing of the laundry washing machine, characterized in that said two half-shells (6, 7) include
35 mutually adjacent lower portions (14, 14') of their interior surfaces formed with a planar profile, the forward half-shell (6) having an integrally formed discharge opening (10)

1 disposed laterally of said planar portion (14) and a filter
body (13) immediately communicating with said discharge
opening (10), the rear half-shell (7) having cam means (34,
35, 36, 37) for tensioning the transmission belt (41) con-
5 necting the shaft of a drive motor (25) to a pulley (38)
secured to the shaft of the drum.

2. A tub according to claim 1, characterized in that
said forward half-shell (6) is integrally formed with an
10 annular collar (21) surrounding a front opening (8) of the
tub (5) and adapted to have a forward counterweight (22)
secured thereto by means of screws (23) cooperating with
expansion dowels or the like, and with a washing liquid
inlet pipe socket (9) projecting outside tub (5) and
15 having a passage of circular cross-section restricted at
the entrance into the tub (5) by a semicircular partition
(11) projecting into said passage from the lower part of
said pipe socket (9).

20 3. A tub according to claim 1, characterized in that
said cam means (34, 35, 36, 37) for tensioning said trans-
mission V-belt (41) comprise a bolt (34) extending through
a perforate support bracket (33) of said motor (25), a
toothed sector (36) formed at the lower part of said rear
25 half-shell (7), and a cam (35) integrally connected to said
bolt (34) and having a toothed profile extending along a
spiral curve of a progressively increasing radius with
respect to the axis of said bolt (34), said bolt (34) and
cam (35) being biased by a spring (37) to rotate towards a
30 position in which the toothed profile of said cam (35)
engages the toothed sector (36) formed at the lower part
of said rear half-shell (7).

4. A tub according to claim 1, in which said half-shells
35 are provided with flanges for the interconnection of said
half shells, with a sealing gasket positioned therebetween,
and for anchoring the elements for the suspension of the
tub in the housing of the washing machine, characterized in

1 that at least one lower flange (3) is configured so as to permit a circulation pump (19) communicating with said filter body (13) to be directly mounted on said tub (5).

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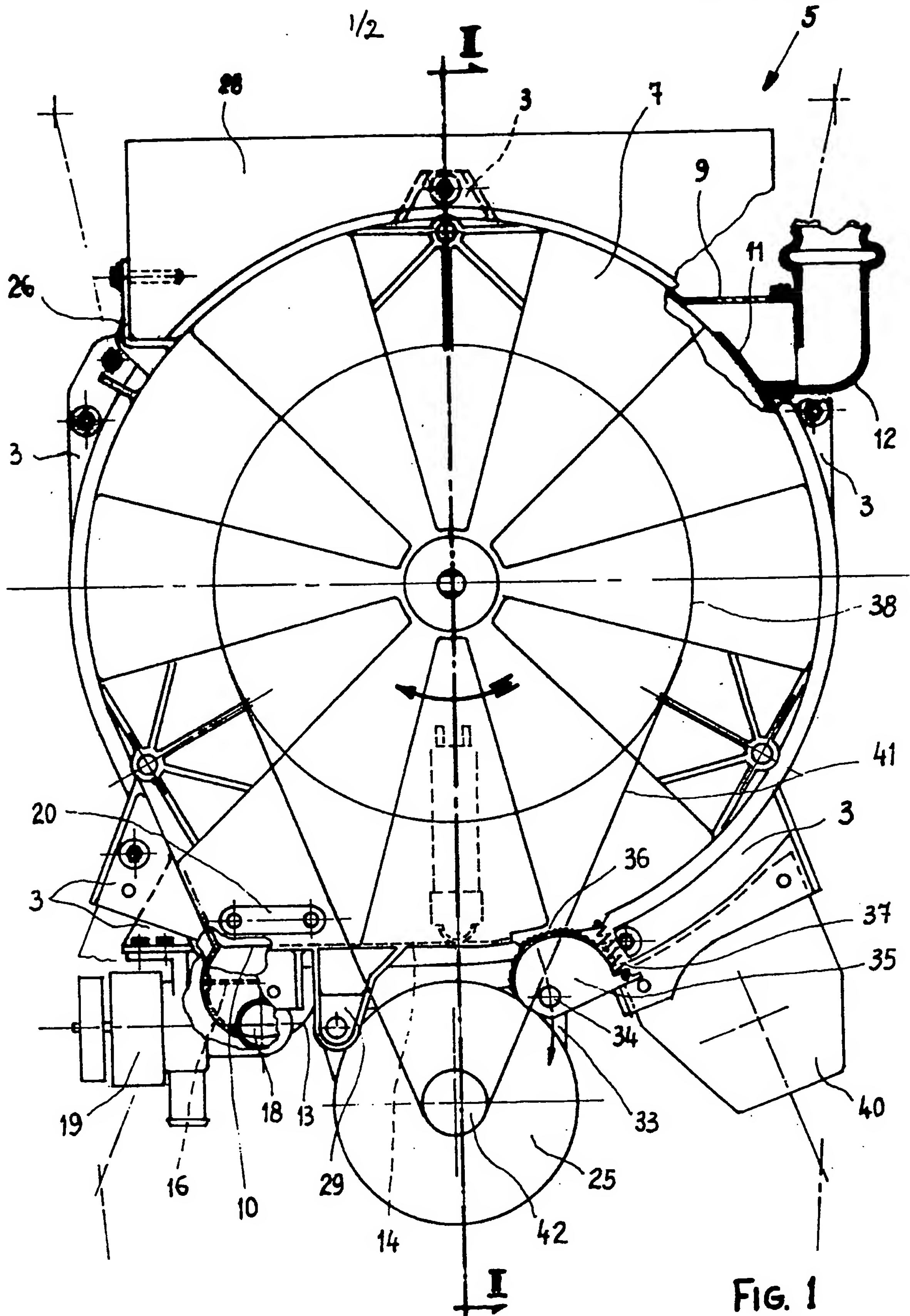
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